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Federal Communications Commission  
Office of Secretary



**NATIONAL SCIENCE FOUNDATION**

4201 Wilson Boulevard, Arlington, Virginia 22230

ET Docket #98-206

September 8, 2000

Mr. Norbert Schroeder  
Acting Chairman, IRAC  
U.S. Department of Commerce  
Washington, D.C.  
20230

Dear Mr. Schroeder:

The National Science Foundation (NSF) provides the comments below with regard to the FCC's *Notice of Proposed Rulemaking "NPRM" on Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku- Band Frequency Range and Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates.*

NSF is very concerned with potential out-of-band interference into the 10.60 - 10.7 GHz band from FSS systems that may soon operate in the upper adjacent band. The 10.6 - 10.7 GHz band is an important one and is extensively used by radio astronomers in the U.S., and worldwide for continuum observations of e.g. quasars. The physics of these objects, of very small angular size, is not well known and Very Long Baseline Interferometry (VLBI), in which radio telescopes at widely separated locations are used in a highly coordinated manner to obtain extremely high angular resolutions, is often employed to observe them. The band is also a crucial one for Earth observations, used to obtain reliable rainfall measurements.

The 10.6 -10.7 GHz band is allocated to the Radio Astronomy, Earth Exploration Satellite (passive) and Space Research (passive) Services on a primary basis, while the 10.68 - 10.7 GHz portion of the band is allocated exclusively to these services, worldwide. Footnote US211 urges space stations in the 10.7-11.7 GHz band to take all practical steps to protect radio astronomy operations. Radio astronomy observations are among the most sensitive ones made by mankind and even unwanted emissions through zero dB sidelobes

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may completely destroy observations. The harmful interference limit to radio astronomy in the 10.68-10.7 GHz is  $-240 \text{ dBW/m}^2 \cdot \text{Hz}$  (see Recommendation ITU-R RA.769). A Draft New Recommendation, expected to be approved soon at the ITU, specifies that for evaluation of interference, a criterion of two percent be used for data loss to the RAS due to interference from any one network, in any frequency band which is allocated to the Radio Astronomy Service on a primary basis, and therefore it is considered that the harmful interference limit can be exceeded at radio observatories for 2% of the time. For satellite transmissions, within 5 degrees of the main beam axis of the radio astronomy antenna, an extra 15 dB attenuation would be required. Therefore, satellite transmitters would have to meet a level of at least  $-255 \text{ dBW/m}^2 \cdot \text{Hz}$  in the 10.68-10.7 GHz band.

NSF requests that U.S. radio astronomy observatories (listed in Annex 1) be protected from out-of-band emissions of FSS satellite systems licensed in the U.S. and operating next to the 10.6-10.7 GHz passive band to the above level. For regulatory purposes, the addition of a footnote to the U.S. allocation table limiting out-of-band emissions of FSS systems at radio astronomy sites would be appropriate. Such a footnote could be modeled after those adopted recently at WRC-00 (e.g **S5.511A**). The proposed text is given in Annex 2.

# ANNEX 1

## U.S RADIO OBSERVATORIES OBSERVING AT 10.6 GHz

OBSERVATORY	LONGITUDE o ' "	LATITUDE o ' "	ELEV. m
<b>Arecibo Obs.</b>	W 66 45 11	N18 20 46	496
<b>Green Bank Telescope (GBT) Very Large Array (VLA)</b>	W 79 50 24	N38 25 59	825
	W107 37 04	N34 04 44	2126
<b>Very Long Baseline Array (VLBA) Stations:</b>			
Pie Town, AZ	W108 07 07	N34 18 04	2371
Kitt Peak, AZ	W111 36 42	N31 57 22	1916
Los Alamos, NM	W106 14 42	N35 46 30	1967
Ft. Davis, TX	W103 56 39	N30 38 06	1615
N. Liberty, IA	W 91 34 26	N41 46 17	241
Brewster, WA	W119 40 55	N48 07 53	255
Owens Valley, CA	W118 16 34	N37 13 54	1207
St. Croix, VI	W 64 35 03	N17 45 31	16
Hancock, NH	W 71 59 12	N42 56 01	309
Mauna Kea, HI	W155 27 29	N19 48 16	3720

## ANNEX 2

### Proposed U.S. footnote

US XXX: In order to protect the radio astronomy service in the band 10.68 - 10.7 GHz, the aggregate power flux-density radiated in the 10.68 - 10.7 GHz band by all the space stations within any non-GSO FSS (space-to-Earth) system operating in the 10.7 - 11.7 GHz band shall not exceed the level of  $-182$  dB (W/m<sup>2</sup>) in a 20 MHz bandwidth, into any radio astronomy observatory site for more than 2% of the time.